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Speech of His Highness the Maharaja of Mysore

at the Opening Meeting of the Board of Agriculture in India held at Bangalore on the 21st January, 1924.

MR. MILLIGAN AND GENTLEMEN,—

The Board of Agriculture in India meets to-day for the first time in an Indian State. It gives me, therefore, peculiar pleasure to welcome you to Mysore. The importance of Agriculture to the prosperity of India cannot be too frequently emphasized. It is the industry upon which three-fourths of our people depend for a livelihood. More than this, it forms the foundation upon which most of our other industries are built. Work that is done towards the development of this, our basic industry, must, therefore, have the most profound and far-reaching effects on the prosperity of the country.

Agricultural Problem in India.—The questions which you are to discuss during the next few days give but a faint impression of the magnitude and complexity of the problems which confront you. Not only have you to investigate problems connected with soil, climate, crops and live-stock, which are immensely more varied than are to be found anywhere else in the world, but you have to adapt your results to economic conditions which almost preclude any but the most inexpensive innovations in agricultural practice. You have to carry on demonstration and education work on a scale

almost unparalleled, and finally you have, at the same time, in very large measure to carry on the supply of improved manures, seeds, live-stock and implements to the actual cultivators.

Agricultural Co-operation.—I note among the important subjects you are to discuss at this meeting, one dealing with agricultural co-operation. It seems to me that along that road should finally lie your freedom from the work of retail suppliers and distributors of agricultural necessities. I quite appreciate the difficulties which confront attempts to organize our agriculturists for co-operative effort, but, gentlemen, these difficulties must be overcome if your years of painstaking scientific investigation are to bear the fruits of which they are worthy and which Indian Agriculture demands. I trust that the results of your deliberations on this subject will enable local governments to deal with this important question more effectively than they have been able to do in the past.

Cattle Improvement.—Much of your time will be devoted to a consideration of the question of cattle improvement. I find that three subjects on your agenda are devoted to various phases of this question. The improvement of our live-stock of which cattle form the principal item is undoubtedly one of the most important questions affecting Indian Agriculture to-day, and it is one in which I personally take a special interest. We have scattered here and there throughout India, breeds of cattle most admirably adapted to local conditions, but unfortunately, these breeds in a comparatively pure form comprise a very small and, in many cases, a diminishing proportion of our total cattle population. In Mysore, we are more fortunate than many parts of India in having, in addition to a considerable number of private herds of good cattle, a nucleus of most excellent draught stock in our Amrit Mahal herd. As a result of these two sources of supply, Mysore is to-day a centre for the supply of draught cattle to the neighbouring districts of British India, and very large numbers of our cattle are sold for export every year. Notwithstanding our relatively favourable position the proportion of really good cattle in Mysore is lamentably low.

Work on cattle improvement in India which may be considered as on scientific lines, has barely begun. I would urge upon you the necessity of laying now at the beginning, broad and sound foundations for this work. As compared with crop improvement, work

on cattle improvement is bound to be a slow business and the consequences of mistakes made at the beginning are certain to be correspondingly more serious. A sound policy and a firm determination on the part of Local Governments and Agricultural Departments to carry out that policy till results are achieved are essential to success.

Experimental Farms.—Among the subjects you are to discuss, I find one dealing with the question of Experimental Farms and whether or not they should be expected to be self-supporting. There is a very natural desire on the part of every one in India to-day that expenditure on the machinery of Government should be cut down to the minimum, but the expectation that experimental farms should and can be made to pay must have arisen from a misunderstanding of the functions of these farms.

Experimental Farms should, it seems to me, be looked upon primarily as outdoor laboratories where you seek for definite information as to the best methods of crop and live-stock production for a particular area. Just as a large manufacturing concern maintains one or more laboratories with a scientific staff to investigate manufacturing and other problems which confront it, so the State maintains these farm laboratories for the investigation of problems connected with its main industry, Agriculture. It is safe to say that no manufacturing concern would expect its scientific laboratories to be self-supporting although it is quite conceivable that some products from these laboratories would have a high money value. In the same way, it appears to me extremely unwise and shortsighted to lay emphasis upon the money-making side of the Experimental Farm. At the same time, the greatest care should be exercised to see that funds are expended as economically as is possible consistent with sound work. Certainly, an Agricultural Department should be judged not by the money returns obtained from the farms under its control, but by the influence it exerts upon the agriculture of the State. A criterion similar to this is the one by which any manufacturing concern would judge the usefulness of the laboratories it maintains.

I should like to mention here a word of appreciation of the excellent work which the Mysore Department of Agriculture is doing under the control and guidance of its present experienced head. Dr. Coleman is both a successful administrator and a practical scientist,

and he is ably assisted by a band of highly qualified and capable officers.

Conclusion.—The first meeting of this Board was held nineteen years ago. Since then, in all parts of India, much real progress has been made, and you have the satisfaction of being able to see unmistakeable evidences of the results of your labours. But, gentlemen, when we look at the field that is open before you, when we consider the needs of Indian Agriculture, we must all of us be struck by the immensity of the task that lies ahead. The immense distance which lies between Indian Agriculture as it is and Indian Agriculture as it should be, calls for the most strenuous efforts you can put forward and for the most loyal support and recognition of your work on the part of Local Governments. Yours is a task which might well give pause to the most determined minds. May you go forward with stout hearts, and may your deliberations in Bangalore strengthen your purpose and clarify your vision for the task that lies before you!

Speech by Mr. S. Milligan, M.A., B.Sc.,

Agricultural Adviser to the Government of India, at the Opening Meeting of the Board of Agriculture in India.

Your Highness,—

My first duty is to express the appreciation of the members of this Board of Your Highness' kindness in inviting us to hold our biennial meeting in your State and the additional honour in presiding at our opening meeting. As Your Highness has just said, this is the first occasion on which the Board has met in an Indian State. It is moreover also the first occasion in the history of the Board on which a Ruling Prince has consented to preside at its opening meeting. The occasion is unique and, if I may say so, inspiring. Mysore is justly proud of its position amongst Indian States. Here the educational system is on a high level; co-operation has made rapid strides, and the importance of scientific research receives its due recognition. It is significant that the Indian Institute of Science is located at Bangalore. Of primary interest to our Board is the well-organized and highly successful Department of Agriculture. It is a well-known fact that the prosperity of this State is due in no small measure to

the incessant and unsparing efforts of its highly enlightened and sympathetic ruler. I am sure that the words of encouragement Your Highness has been kind enough to say will prove an incentive to further work not only in Mysore but throughout India. We may congratulate ourselves on the opportunity afforded to us by Your Highness' Government of obtaining a first-hand acquaintance with the agricultural problems of the State and what has been achieved by the Agricultural Department. Your Highness, this Board has been associated with the work of the Agricultural Department in India since its reorganization eighteen years ago. It has been of extraordinary value in the development of the Imperial and Provincial Departments. It has succeeded in preserving a wide outlook amongst workers in the provinces and has been the means of promoting collaboration, unity of purpose, and standardization of agricultural education throughout India to a degree which would have been otherwise impossible. I think I may also be permitted to say that Your Highness' Government have profited through our deliberations in the organization of its own Agricultural Department. On the other hand the Board has gratefully to acknowledge the support it has always received from this State in sending adequate representation to our meetings, and I can assure Your Highness that no Department of Agriculture in India is more highly thought of than that of Mysore and no members of this Board are held in higher esteem than the delegates from this State. The Mysore Agricultural Department has achieved fame not only by its practical methods of applying scientific knowledge and technique to the solution of its agricultural problems but to the marked success which has attended its efforts. The annual value of the improvements introduced now amounts to many lakhs of rupees and thus the expenditure on the Department is returned to the soil many times over. Your Highness, this Board is at times a somewhat critical assemblage but it recognizes as far as Mysore is concerned that the Agricultural Department is tackling the right problems in the right manner.

Now I am sure Your Highness will pardon me for addressing a few words to the Board before we start our deliberations as set down in our agenda.

Since we met last, the Agricultural Department, as a whole, had had a very anxious time owing to the financial situation which

appears to have a tendency to become chronic. Although the current activities of the department have not been affected to any considerable extent, financial stringency has unfortunately stood in the way of the development which had been so seriously delayed during the war. Recruitment of experts to existing vacancies has been limited to nine officers in the Indian Agricultural Service and five in the Civil Veterinary Department, in addition to two Indian Officers promoted from the Provincial to the Indian Agricultural Service and one to the Indian Civil Veterinary Service. The number of vacant posts in the Indian Agricultural Service is still high, no fewer than forty-one.

Gentlemen, during the last Board we had to record the death of no fewer than four of our members. On this occasion we have unfortunately to add the names of Mr. Petty, Mr. Henry and Thakur Mahadeo Singh, all in the prime of life and of much promise. I would desire the Board to formally express its sympathy with their sorrowing relatives.

We have also to regret the retirement of many of our old members. We all miss the familiar figures of Colonels Smith and Rennie and of Messrs. H. C. Sampson, G. Evans, A. A. Meggitt and C. Somers Taylor. We are glad to have Mr. Noyce, Colonel Matson, Mr. Roberts and Mr. Higginbottom again with us and have to thank other official and non-official visitors for sparing so much of their valuable time in coming to assist us in our deliberations.

The scheme for the expansion of the Pusa Institute and the provision of post-graduate training to qualify Indians for admission to the Indian Agricultural Service which had received the approval of the Secretary of State has, owing to financial considerations, not been proceeded with. A beginning has, however, been made in providing post-graduate training in sciences allied to agriculture, including Animal Husbandry and Dairying. A similar training for veterinary officers has been arranged for, as an experimental measure, at Muktesar.

Another important development is the transfer of Bangalore, Wellington and Karnal Dairy and Cattle-breeding Farms from the Military to the Agricultural Department with a view to provide us with experimental and educational facilities. As already pointed out, a beginning has been made this year in the institution of post-graduate training in Animal Husbandry and Dairying. A Dairy

Manager's course has also been started at Bangalore. The students who pass through the course successfully will receive the "Indian Diploma in Dairying".

I now turn to the programme of work before us. As usual, some of the subjects for discussion are to be considered in Committees before they are laid before the general meeting, and to these subjects I would draw your attention for a few minutes.

SUBJECT I :—*To review the progress made in non-credit Agricultural Co-operation in India and to consider ways and means of stimulating further progress.*

It is, I think, generally admitted that if we are to receive the full benefits of co-operation it must not stop with co-operative credit and for this reason we welcome the efforts, successful in many cases, of co-operative effort through the establishment of non-credit societies. The Cotton Sale Societies of the Bombay Presidency, the Irrigation Societies of Bengal, the Consolidation of Holdings Societies of the Punjab are some of the noteworthy examples of useful and successful co-operative effort. You are being asked to review the progress so far made in such developments and to consider ways and means of stimulating their further progress. I do not wish to bind down the Committee by any specific term of reference, but desire them to develop the subject themselves.

SUBJECTS II, III & IV refer to cattle-breeding and I will have occasion to speak on them at the Cattle Conference which is to be held during this week and I need not refer to them here. His Highness has just pointed out to us that his State is a centre for the draught cattle to the neighbouring districts of British India and that therefore cattle-breeding operations in Mysore possess an importance extended beyond its boundaries. It has been one of our cardinal doctrines for some years back that cattle-breeding is in its wider aspects of general interest to the people of India and we welcome Your Highness' endorsement of our views.

SUBJECT V.—The subject of improvement of crop forecasts has been discussed in the past at considerable length but although some improvements with regard to publication of supplementary forecasts of important crops like cotton have been effected since the Board discussed this subject in 1919, our old friend the normal yield still continues to crop up. Crop cutting experiments are at present

the only basis for this estimation but it is obvious unless these are carried out properly and in sufficient numbers they are admittedly of small value. The present wave of retrenchment has been responsible for the cutting down of the statistical staff both under the Government of India and in Provinces, and it seems necessary to review the effect of this on crop statistics. Accurate estimates of production are admittedly important not only to the Agricultural Department but also for trade purposes and general administration. In addition to the points covered by the subject, as proposed for consideration, it is also desired that the Committee should consider the question whether the present system of weekly telegrams from some of the Directors of Agriculture to the Director-General of Commercial Intelligence regarding crop conditions may not be so developed as to convey an adequate amount of information to the public regarding the condition or progress of crops.

Subject VII.—The question whether it is possible or desirable to make Government Farms pay has already been referred to by Your Highness and I am sure the Board will agree generally with the views so clearly expressed by Your Highness. The question is, however, now constantly coming to the front and has assumed the importance in some of the Provincial Councils. It was discussed at some length in 1908-10 in certain articles published in the *Agricultural Journal of India* and the general conclusion then arrived at was that, as stated by Your Highness, an experimental station is really a field laboratory, and that just as the processes in a chemical laboratory have to be cheapened down before they become a commercial possibility so it is impossible to compare the expenditure on an experimental station with that of ordinary commercial farming. I should like to add this without prejudicing discussion on the subject that our business is not to show the Indian cultivator how to make his holding pay but how to make more out of it. The idea, it seems to me, arises from a wrong view as to the state of agriculture in India. Indian agriculturist is not a capitalist. Agriculture but forms a very modest means of earning a living from the soil. So far as paying is concerned there must be a surplus or the whole fabric would cease to exist. Our business is, as I have just said, to increase the outturn and value of the holding and not to demonstrate whether we can make land pay or not.

SUBJECT VIII.—The question of agricultural implements and power machinery was discussed by the Board of Agriculture in 1919 and again in 1922. The 1919 Board recommended the establishment at Pusa of a Section of Agricultural Engineering to investigate the use of motor ploughs and tractors, and the early appointment of special Agricultural Engineers in all Provinces. Since then a post of an Agricultural Engineer at Pusa has been sanctioned, but it has not been possible to provide funds to fill it. Agricultural Engineers have, however, been appointed in all Provinces except Bengal, Assam and the North-West Frontier Province and considerable progress is, I am glad to say, visible. The efficiency of agricultural implements is one of the most important questions in India. Especially is it so in Mysore State and in tracts similarly situated. It is a certainty that could the surface of the soil be broken up ever so slightly before the monsoon, very large crop increases would follow. I was especially interested to see the work at the Hebbal Farm yesterday and to see a new type of plough designed for ploughing up hard land by cattle —a very excellent design which I can recommend to all. It may seem a small thing to a casual visitor but I can see in it the beginnings of great things. I am giving you this example because I am quite sure that many agricultural difficulties can be removed by the right appliances.

SUBJECT X.—The recommendations of the Indian Sugar Committee regarding the Coimbatore cane-breeding station are: that the station should be made permanent and developed, and that it should be taken under Imperial control. Owing to the financial stringency, to which I appear to be always referring, the scheme for the development of this station has not been proceeded with. There can be no doubt as to the value and necessity of a permanent sugarcane breeding station like the one at Coimbatore, and you have to consider how best the work should be developed having regard to the existing financial situation.

Before I conclude, I wish to invite reference to our time table. You will see that we have a Cattle Conference in addition to the Board during this week. It will not therefore be possible to give two full days to Committee meetings as had been the practice in previous Boards. We cannot, therefore, get through our agenda unless we take up the discussion by the full Board of at least one

or two subjects to-day. The Board will therefore meet at 2-30 P.M. to-day in this hall. I have again to thank Your Highness on behalf of the Board for the great honour and kindness you have shown to us.

Mysore Cottons and Their Improvement.

BY

V. N. Ranganatha Rao, L.Ag.,

of the Mysore Agricultural Department.

I. Indigenous Cottons.

Amongst the non-food crops of Mysore, cotton occupies the foremost position. It will be seen from the following statistics that the area under cotton is gradually on the increase and in the last ten years it has actually trebled. Dr. Coleman in his written statement to the Indian Cotton Committee says as follows :—

"I anticipate an increase in the average area under cotton for the decennium 1915-1925 of at least fifty per cent of the average area for 1905-1915."

Decennium	Average area under cotton
1885—1895	49,614 acres
1895—1905	54,918 acres
1905—1915	94,790 acres

This increase is due, no doubt, to the rise in prices but incidentally it proves that Mysore is a very favourable area for cotton development.

Some years ago a farm was established near Hiriyur in the heart of the cotton growing area of the Mysore State. Scientific breeding work on indigenous cottons was then started and some progress in improving these cottons has been made. It is proposed to discuss in this paper the work that is being done towards improving these cottons.

The improvement of any crop may be brought about by one of the two following methods :—(1) Introduction of superior variety from outside. (2) Improving the local existing varieties by means of selection or hybridization or by both.

The introduction of varieties from outside, especially with reference to cotton has, on the whole, been a failure. Prof. Gammie, the late Imperial Cotton Specialist, has very well traced in his paper on "Work done towards the Improvement of Cotton in Bombay Presidency,"* the various attempts made to establish American and Egyptian cottons which ended in almost a complete failure. He concludes as follows :—"Throughout the whole of the history of the attempts made to improve the cottons of India it is sufficiently evident that no consideration was ever given to the chance of improving any indigenous variety by scientific methods, the sole aim seemed to be to compete with the American market by introducing the cultivation of its chief cotton varieties into India."

Although the area under cotton in Mysore is comparatively small (115,000 acres, ·5% of the total area in India), still we find three distinct varieties growing under one popular name, "Sannahatti". In the northern part of the State bordering on the Dharwar district of the Bombay Presidency we have a cotton the seeds of which have a white fuzz growing on them. This fits into the description of *Gossypium herbaceum Linn and G. obtusifolium Roxb. var Wightiana Watts.* This occupies one-half of the Sannahatti area in the State. It gives a fairly high yield (between 8-10 maunds of 22 lbs. per acre) with a ginning out-turn ranging between 20 to 25%. The cotton is fairly strong with a length of $\frac{3}{4}''$—$\frac{7}{8}''$. On the other hand, in the taluks of Molakalmuru, Pavagada and certain portions of Jagalur we find a cotton with naked seeds growing either as a pure crop or as a mixture with a fuzzy seeded variety. This corrsesponds to Prof. Gammie's *Gossypium herbaceum var melanosperna* and to Watt's "Tellapatti". This is a heavy yielder and the lint has a good white colour, staple long and level and has also a fair strength. This gives a low ginning out-turn.

Lastly, we have a small area under cotton in the Mysore district. The variety that is generally grown there is the so-called "Nadam", a perennial variety introduced from the Coimbatore district. We find this occupying the best cotton soil in the district although this variety outside Mysore is generally grown on red soils. This has a low yield and ginning out-turn though a long and strong fibre. This answers to *Gossypium obtusifolium Roxb.* The one point in the above

* *Vide* Agricultural Journal of India, Vol. III, Part I,

plant which seems to have been overlooked by other workers on cotton is the red colour in the filaments on the lower half of the non-delphous stamens which can be distinctly seen in a fresh flower. Recently, we have been able to isolate a clean seeded variety from amongst the "Nadam" plants. We have not been able to find any reference in the cotton literature to this type, though Mr. Hilson casually mentions it in his written statement to the Indian Cotton Committee.*

Although the varieties described above are grown in three distinct tracts, still in a field of Sannahatti we find a mixture in various proportions of all these varieties. For instance in a field of Jowari Sannahatti it is not uncommon to find Nadam and Tellapatti plants.

So the very first thing we did was to grow in pure cultures plants of all these varieties. When sufficient pure seed from all the varieties was obtained it was sown in plots of one-twentieth acre, each variety being repeated three times to get definite figures regarding their yield and ginning out-turn.

The following statement gives the yield and ginning out-turn of the three varieties of cotton :—

Name of variety	Average yield per acre lbs. oz.	Average ginning out-turn
Chitaldrug Sannahatti (Fuzzy seeded)	231 4	28%
Nadam	186 4	21%
Chitaldrug Sannahatti (Clean seeded)	230 10	24%

Of the three varieties we find that the fuzzy seeded Sannahatti has very many advantages over the other two both from the ryots' as well as the spinners' point of view. Further the fact that it occupies half the cotton area warrants our devoting main attention towards its improvements.

In this variety we have been able to isolate two types of plants based on the branching habit. As is well known the cotton plant possesses two kinds of branches, one generally called a vegetative branch which does not produce flowers but produces other secondary

* Minutes of evidence taken before the Indian Cotton Committee, Vol. II, Agricultural, Part II, p. 133.

branches which bear flowers and fruits. These branches are long and spreading and hence require more space to develop. The other kind is short and bears one to three flowers. Such a branch is called a fruiting branch. The main stem of a cotton plant may be divided into two distinct zones, the lower portion of the stem produces mostly negative branches and this is called the vegetative zone, while the upper portion has fruiting branches and hence known as the fruiting zone.

The first type consists of plants which have very few vegetative branches but mostly fruiting branches. In other words we have a plant possessing a single main stalk bearing a large number of fruits. In the second type, on the other hand, the main stem supports a number of vegetative branches while the fruiting zone is to a great extent reduced. It has been ascertained that this branching habit is heritable in the two types. When seeds of these two types were sown separately in a pure condition and harvested the following figures were obtained :—

Type	Area	1st repetition	2nd repetition	3rd repetition	Total
1st type "C" type	1′ 20 ac.	8—4	7—1	7—6	22—11
2nd type "E" type	1′ 20 ac.	5—12½	6—8	6—12½	19—1

From the above it will be seen that the first type gives a higher yield than the second type. This is in accordance with the observation of other workers.*

A number of plants of this type was separately sown and plants harvested. It was found out that there was a wide range of variation in ginning out-turn. We had plants which gave as low as 18% and plants that gave as high as 28%. Plants of the latter type were selected and two strains from these are being tried on a large scale with a view to see if we can profitably introduce this type of cotton.

This first type being a compact plant admits of closer planting while the second type being bushy requires more space for its

* Report of the Imperial Cotton Specialist for the year 1916—17 O. F. Cook. Single stalk cotton culture, U. S. Dept. of Agriculture, Bureau of Plant Industry.

Thomas H. Kearney, Breeding new types of Egyptian Cotton, Bulletin 200.

development. In order to ascertain the amount of space required to get the highest yield the following experiments were tried :—

First experiment giving half-a-foot spacing for both the types.

Second experiment giving one foot spacing for both the types.

Third experiment giving half-a-foot spacing for 1st type and one foot spacing for the 2nd type.

The following results were obtained :—

	1st type		2nd type	
	lbs.	oz.	lbs.	oz.
First experiment	132	4	125	0
Second experiment	103	12	135	12
Third experiment	150	0	128	0

From this it will be seen that sowing the first type giving half-a-foot spacing gives the best result.

In the Report of the Imperial Cotton Specialist for the year 1916-17 we find the following remarks regarding this cotton (p. 3) :—"Its chief defects are a rather low ginning percentage and the rosy colour of its cotton in bulk which detracts from its value in the eyes of the Bombay trade which prefers a quite white cotton."

It has been ascertained that the rosy colour is due to a variety of cotton having a drab colour grown in the mixture. When this cotton is eliminated the colour of Chitaldrug Sannahatti has materially improved.

The following is the mill report on the local Sannahatti and of the two strains :—

(1) *Local Sannahatti.*—The staple of this sample is irregular both in length and strength. There is a great amount of short fibres in the sample and it is also discoloured.

Sannahatti Sel. 45.—The colour of this sample is good being very white. The staple is level and the strength moderate.

Sannahatti Sel. 69.—This sample has a good white colour. The staple is level and the strength good.

The selection work on Mysore Nadam consists in isolating a type which gives a high ginning out-turn and a better quality of lint. We have been able to secure about a dozen plants which have given a ginning out-turn of 27% and whose quality of lint is equal to the Bani of Central Provinces. We have not as yet, owing to unfavourable weather conditions, been able to find out the yield of these plants.

Now we come to the last variety amongst Sannahattis. This is the variety which possesses black seed. In the classification of cotton by Watt, this variety does not find a place, as he has not made a group for cottons with black seeds with united bracts. Besides he traces the origin of this cotton as a result of hybridization between Bourbon (a plant belonging to the New World group) and Uppam (a plant belonging to the Old World group). This statement requires further support. The writer tried to effect crosses between American cottons and Roseum in which he did not succeed. Mr. Hilson, some time back, tried to effect a cross between Cambodia cotton and Roseum but failed. Therefore it seems that it is not possible to effect a cross between Bourbon and Uppam. The origin of this naked cotton must be a sport. As already stated we have isolated another clean seeded variety from amongst the Nadam cotton. Not much work has been done on these black seeded varieties although one interesting point that has been observed is that one of them is a heavy yielder.

Mr. Leake (now Dr. Leake) was also under the impression that there was no naked seeded variety amongst the Indian cottons. For he says, "At present no Indian cottons are naked seeded". He continues, "the cotton seed industry in India is in its infancy but will develop and Indian cotton seed is handicapped by the presence of the fuzzy adherent to the seed. This fuzz not only lessens the value of the cake derived but it diminishes the value of the seed as a direct fodder. The advantages of a naked seed are clear."

We have been trying to isolate a bushy type from this variety which gives a high ginning out-turn.

Hybridization work in Mysore cottons has been started and some progress in this work has been made. This will be described in another paper.

Some of the More Common Ailments of Sheep.

BY

S. D. Achar,

Veterinary Inspector, Shimoga.

He prayeth well who loveth well,
Both man and bird and beast;
He prayeth best who loveth best
All things both great and small;
For the dear God who loveth us,
He made and loveth all.

—*Coleridge.*

Dear Reader,

Please consider the following facts with regard to our sheep :—

(1) Sheep are one of the chief sources of rural wealth and furnish products of great value as wool, meat, manure, skin and fat to agriculture, manufacture and commerce. Their health, growth and development is, therefore, an important economic responsibility.

(2) The health of sheep greatly determines the safety of cattle and even that of human beings as there are numerous diseases of sheep of a contagious nature or of parasitic origin which affect cattle and men.

(3) Movement of sheep from the affected villages is a fertile source of the spread of contagious diseases. Too often have I traced Rinderpest among cattle to sheep from affected villages, innocently purchased at *shandies* or at fairs. This will be amply vouched for in the experience of other Veterinary Inspectors besides myself. The well-being of our flocks should, therefore, be safe-guarded by all means in the interests of public health and in the interests of our droves and herds.

Almost all the maladies of sheep are preventible and curable like those of cattle and of men and therefore, it is no counsel of perfection I am giving.

Now say whether these creatures, whose health and lives minister to the farmer's wealth and the country's good and whose ailments jeopardize the well-being of other animals also and of men, have not a just claim on intelligent management when they are well and rational treatment when they are ill. Yet how are these creatures managed

and treated ? They are the most neglected of all domestic animals. By gross mismanagement many are daily made victims to preventible maladies. Their agony and sufferings are unnoticed or are uncared for in many instances. In others, cures are attempted by rough administration of dangerous drugs or by means of instruments of torture, which are mildly characterized as "Remedies worse than the diseases". Thus year by year our flocks are decimated, the breeder loses and the country with him. This is the case when even ordinary ailments affect them. The state of affairs is at its worst when contagious diseases break out among them. Such diseases are invested by sheep-breeders with a mystic origin and aspect. Preventive and curative measures are opposed for fear of still further rousing the wrath of the Goddess who is held responsible for those diseases. The result is a disastrous and highly deplorable continuance and spread of the diseases from flock and in the case of diseases common to all ruminants, from flock to drove or herd over a rapidly extending area, culminating in an appalling waste of animal life which, if only estimated in cash terms, would give a staggering figure.

In short, the present attitude towards these animals may be ascribed to the gross neglect of all principles of humanity, laws of nature, and the rules of hygiene. With a view to mitigate unnecessary sufferings and sacrifice of these useful creatures on the altar of ignorance, apathy and superstition, some indications are given hereunder regarding the rational treatment of some of the more common ailments of sheep. The remedies suggested are simple consisting of drugs easily obtainable in the Indian bazaars. These notes are only meant to guide the farmer in the absence of Veterinary advice and assistance—which he should endeavour to secure as early as possible in all cases—in the treatment under emergency of suspicious and dangerous cases. The doses given are for an adult large sheep. Half to one-thirds of the doses should be given to lambs according to their age and size.

PRESCRIPTIONS.

(1) *Aperient (mild purge).*—

Linseed oil	$\frac{1}{8}$ seer (measure)

(2) *Purgative.*—

Epsom salt	6 tolas
Sulphur	1 tola

Ginger .. .. 1 tola
Treacle .. .. 4 tolas
Mix in hot water ¼ seer (measure) and give when cool.

(3) *Stimulants.*—
Powdered caraway seeds .. .. 1 tola
Ginger .. .. ¼ tola
Black pepper .. .. .. ⅛ tola
Treacle .. .. 2 tolas
Country spirit .. .. .. 1 table-spoonful
With ¼ seer (measure) linseed gruel, every four hours, as necessary.

(4) *Cordials.*—
Powdered caraway seeds .. .. 1 tola
Sal-ammoniac .. .. .. ¼ tola
Ginger .. .. ¼ tola
Powdered nuxvomica .. .. 1/16 tola
In ¼ seer gruel, every 4 hours, as required.

(5) *Tonics.*—
Sulphate of iron .. .. .. ¼ tola
Powdered nuxvomica .. .. 1/16 tola
Chiretta .. .. .. ½ tola
Treacle .. .. .. 2 tolas
In food once daily.

(6) *Alterative.*—
Epsom salt .. .. .. 2 tolas
Sulphur .. .. ½ tola
Nitre .. .. ¼ tola
Ajwan .. .. ¼ tola
Ginger .. .. ¼ tola
Powdered nuxvomica .. .. 1/16 tola
In ¼ seer (measure) gruel, daily.

(7) (*a*) *Astringent* (*internal*).—
Chalk (powdered) .. .. ½ tola
Catechu .. .. ¼ tola
Ginger .. .. ¼ tola
Ajwan .. .. ¼ tola
Twice daily in gruel.

(*b*) *Astringent.*—

Sulphate of copper	1/16 tola
Water	¼ seer (measure)

(8) (*a*) *Vermicide.*—

Oil of turpentine	2 tea-spoonfuls
Linseed oil	¼ seer (measure)

(*b*) *Vermicide.*—

Asafœtida	¼ tola
Sulphur	½ tola
Palas seeds	½ tola

Mix and give one powder daily for 10 days and follow by aperient (1), or purgative (2).

(9) *Mouth Gargle.*—

Alum or Borax	1 tola
Water	½ seer (measure)

(10) (*a*) *Skin Disease Dressing.*—

Sulphur	5 tolas
Nitre	1 tola
Rape oil	½ seer (measure)

Mix and apply after clipping the hair.

(*b*) *Skin Disease Dressing.*—

Tobacco decoction	(1—10)

(11) (*a*) *Wound Dressing.*—

Phenyle and water	(1—100)

A good sheep-wash.

(*b*) *Wound Dressing.*—

Camphor	1 part
Sweet oil	4 parts

Mix together.

(*c*) *Wound Dressing.*—

Turpentine	1 part
Sweet oil	8 parts

Mix together.

(*d*) *Wound Dressing.*—

Borax
Powdered charcoal
Alum
Sulphate of copper

Mix equal parts.

(*e*) *Wound Dressing.*—

Phenyle, Turpentine, Honge oil } Mix equal parts (for fly-blown wounds).

(*f*) *Wound Dressing.*—

Carron oil (for burnt wounds).

(12) *Diuretics.*—

Nitre	¼ tola
Gum Arabic	½ tola
Water or linseed gruel	¼ seer (measure)

(13) *Febrifuge.*—

Epsom salt	1½ tolas
Nitre	½ tola
Camphor	¼ tola
P. Chiretta	½ tola

In water ¼ seer (measure).

Diseases and Treatment.

(1) *Anæmia.*—

Tonic No. 5, good food and fresh air.

(2) *Rickets among lambs.*—

Remove ewes to fertile soils, give them tonic No. 5. Good food as grain or meal, to improve milk. Give the lambs cow's milk and lime water.

(3) *Foot and mouth disease.*—

Epizootic Aphthe : Remove animals to a dry fold or yard. If bowels are constipated give aperient 1. Wash mouth twice daily with mouth gargle No. 9. Dress feet with wound dressing 11(*c*) or 11(*e*). After cure give tonic No. 5.

(4) *Small-pox.*—Immediate segregation : Febrifuge No. 13 and diuretic No. 12. During constipation purgative No. 2. Sponge eyes, nostrils and mouth with borax lotion (1 tola to ½ seer of warm water). Fumigate the air of buildings with sulphur fumes. Prevent spread of contagion by cleanliness, ventilation and disinfection and the burning of litter and manure and deep burial of carcases. The affected may be mixed with the healthy 6 weeks after complete recovery.

(5) *Husk or hoose.*—

Give tonic No. 5 and a little common salt with food. Give turpentine 1 tola in rice gruel daily for 2 or 3 days. Sulphur fumigation to affected ones in closed pen.

(6) *Foot-rot.*—

Pare hoofs. Dress feet as for foot and mouth disease after washing the feet well with wound dressing 11(*a*).

(7) *Sheep-rot.*—

Good food as oil cake, Bengal-gram and hay. Change of pasture to high ground. Gruel with salt frequently. Tonic No. 5 for 8 or 10 days.

(8) *Hoven or blown.*—

Purgative (2) and clysters every hour.

(9) *Dyspepsia.*—

Aperient (1) and tonic No. (5).

(10) *Diarrhœa.*—

When mild at first give aperient (1) with opium 5 grains. When severe and long continued, give astringent (7) (*a*).

(11) *Dysentry.*—

Aperient (1) with opium 5 grains, later tonic (5). Gruel and other liquid foods.

(12) *Mammitis.*—

Aperient (1), frequent drawing of udder, fomentations and application of turpentine and sweet oil (1—4).

(13) *Wounds.*—

Wash with phenyle lotion, clip hair all round the part and apply wound dressings 11(*b*), 11(*d*), or 11(*e*).

(14) *Sprains.*—

Aperient (1), febrifuge (13), and application of turpentine and sweet oil (1—4).

NOTES AND COMMENTS.

Meeting of the Board of Agriculture.

The Thirteenth Meeting of the Board of Agriculture in India was held at Bangalore on the 21st January, 1924 and following days. The speeches of His Highness the Maharaja of Mysore and the President have been printed *in extenso* in this number of the Journal. Thirty-nine members of the Board and thirty-two visitors were present on the occasion. There were 11 subjects for discussion on the programme of the Board, relating to Cotton, Live-Stock, Agricultural Co-operation, Manures, Experimental and Demonstration Farms, Agricultural Implements and Utilization of Waste Lands. The resolutions passed after a thorough discussion of the subjects on the agenda are also given in this issue.

Resolution 2 deals with the Utilization of Indigenous Phosphates in India. Two methods were discussed in great detail in this connection—one is that of composting it with green manure and the other of composting it with sulphur and utilizing the activities of sulphur oxidising bacteria to make the insoluble phosphates easily available to plants. While the first method is more easy to be manipulated by the ryot, the second, when properly developed and perfected, may be made use of by manufacturers to put cheap superphosphate on the market.

Resolution 4 refers to the consolidation of holdings by the Co-operative Department in the Punjab. It is known to every one that the small size of holdings in this country is a great hindrance to rapid improvements in agriculture. During the course of discussion it was pointed out that the small farmer got less for his labour on the farm than an ordinary day labourer. Whether such a farmer could make any profit at all from agriculture was seriously doubted. The work of the Punjab Co-operative Department in increasing the average size of holding in some villages from 0.6 acre to 6.7 acres without any legislation at all, is really very commendable. As a consequence of such consolidation, the area of waste land decreased, the income of the cultivators showed an increase

varying from 50 to 100 per cent, and the value of the land itself had risen from Rs. 60 to Rs. 200 an acre.

It was also pointed out that the Agricultural Department had to get at the mass of the cultivators who usually owned less than 8 acres of land, if they hoped to achieve any improvement at all It was also contended that it was the duty of the Agricultural Department not only to show to the cultivator how to get an increased yield but also to show him how to make his holding pay. A close co-operation between the Agricultural and the Co-operative Departments was advocated as essential in the interests of the cultivator.

Resolution 5 deals with the financial aspect of Experimental Farms. While we fully agree with the Board that it is neither desirable nor possible to make experimental farms self-supporting, we are of opinion that steps should be taken to demonstrate to people the commercial profitability of the successful results of experimental work. In fact every farm may consist of two parts, an experimental part and a demonstration one. The demonstration farm ought to be run on commercial lines to show that farming can be made to pay. Such a farm, if large enough, may pay for the experimental part of the work as well. In addition, it would serve as a training ground to students in Agricultural Colleges in showing them how to run a farm on commercial lines.

Resolution 16 deals with the importance of work on animal nutrition. Very little is known at present about the digestibility of various indigenous feeds and fodders and the extent to which they are utilized by the local breeds of cattle, and the work of the Imperial Physiological Chemist in this direction will of course be very useful. In addition, some work ought to be undertaken on the economic utilization of famine fodders in times of scarcity. A large amount of work in this direction was done in Germany during the late war when hay and straw were not abundant, and supply of concentrated feeds from abroad was cut off.

Resolutions 17-20 deal with the question of improvement of Live-Stock in India. The live-stock industry in this country has to take into account the sentimental as well as the business side of the question. Unlike in the West, where an animal is sold to the butcher for its full value when it no longer pays to maintain it, sentiment in this country demands that each animal should be

maintained till it dies a natural death. Such a sentimental side of the question cannot be tackled on to the commercial side of the proposition. Those who want to make a profit from animal industry without production of meat must run a separate "pinjra pole" for those animals that do not pay for their maintenance. [B. N. I.]

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Indian Breeds of Cattle in America.

Farmer's Bulletin No. 1361 of the United States Department of Agriculture deals with the Indian breeds of cattle imported for breeding purposes into America. The first known importation seems to have taken place in 1849 and consisted of a bull and two cows of the Mysore breed. The breeds now prominent in Texas are the Nellore, the Gir, the Guzerat, and the Krishna valley ones. The large types imported have shown a marked adaptability to certain sections of the south-west and the gulf coast regions. "Their ability to graze on scant pasture, their resistance to hot weather, diseases and pests and their breeding efficiency are characteristics which make them particularly valuable in certain sections of the gulf coast." [B. N. I.]

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Sunflower Ensilage and Silos.

In a recent publication from the Dominion of Canada Experimental Farms there are two articles on Silos and Ensilage which contain information interesting to readers of the Journal. The author states that sunflower has, during the past five years, developed into the second most important ensilage crop in the Dominion, maize holding first place. It is grown notably in the semi-arid Western Provinces of Canada where there is not sufficient rain fall for maize.

With regard to the stage at which sunflowers should be cut for ensilage the author tells us that while definite information is not yet available the indications are that sunflower should be cut when from 25% to 50% of the plants are in bloom. Less mature plants result in a watery silage and if the crop is left standing much later, the increase in dry matter is more than offset by the marked increase in woody fibre.

The second article deals with the trench silo. It is stated that the introduction of the trench silo has made a great change in the

silo situation in Western Canada. Farmers who have been deterred from making ensilage on account of the cost of construction of a tower silo are now utilizing the very much cheaper trench silo for the purpose. As in Mysore so in Canada the trench can be made as a long and rather shallow hole in the ground with almost vertical sides. The author suggests as dimensions a width of 12 feet to 18 feet, a depth of 7 to 10 feet and a length of 25 to 50 feet. [L. C. C.]

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Brahman (Zebu) Cattle.

An interesting bulletin has come to hand (Farmers' Bulletin No. 1361) from the U. S. Department of Agriculture, entitled "Brahman (Zebu) Cattle".

It is a pity that such a misnomer as Brahman, should be adopted, and we are informed that this term has been adopted by the Committee on Terminology of the U. S. Department of Agriculture. Such nomenclature is liable to mislead the American public into all kinds of misconception. In fact the statement in the text that "In the strict sense, the term 'Brahman' derived from the name of the Hindu divinity Brahma, applies only to the white bulls which alone are regarded as sacred" is in itself an indication of the possible misconstructions of the term. As a generic name, the term Zebu is more appropriate and correct.

There is of course a parallel to be found in India, in the term English cattle, applied so generally to breeds of Western origin, whether they be continental, English or Channel Island breeds. This term is not however officially recognized. This by the way.

A lot of interesting information is contained in the bulletin, which upholds the Zebu type as desirable in the Southern United States, notably Texas. Ability to withstand heat and drought, resistance to ticks and tick-borne disease are the chief features which bring this about. A table showing the thickness of the hides of different breeds of Western cattle and "Brahman" cattle, goes to show that the hide of the latter is thinner than that of four Western beef breeds, and opposes the old theory set up by American breeders attributing the Zebu resistance to ticks to a thicker hide. A comparative study of the different Indian breeds from this standpoint would probably reveal a considerable range of thickness of skin between the breeds.

A statement is made that "Brahman calves when born are small as compared with other breeds but make very rapid growth..... and at weaning time outweigh other range calves produced under the same conditions by from 50 to 75 pounds". This is of great interest, as it is not in accordance with results obtained here, where an infusion of Western blood increases the rate of growth of the offspring. As observations made here have been under domesticated conditions and not on range fed animals, a direct comparison cannot be made.

The prolificacy of Indian cattle is stated to be greater than that of the local range cattle, cows calving very regularly and bulls being able to care for more cows than their Western brethern. In fact the bulletin is well worth reading by any one interested in the cattle industry.

The American market would appear to be worthy of investigation and development. The frequent occurrence of Foot and Mouth disease, Rinderpest, etc., among our Indian cattle presents a formidable obstacle to such a development, and the recent outbreak of Foot and Mouth disease in California which has cost millions of dollars and necessitated the destruction of some of the world's best dairy cattle will strengthen the embargo now in force on Indian cattle.

It seems hardly necessary, but it is difficult to refrain from pointing the moral that here is another source of loss due to the indifferent attitude to epidemic cattle disease in India. [W. D.]

The Colonization Scheme.

We publish elsewhere in this issue the "Scheme for the formation of a Colony of Agriculturists trained in Improved Agriculture" as finally adopted by the Union at the last annual meeting. The Scheme has been sent up to Government for favourable consideration.

The Indian Board of Agriculture in Bangalore.

A Brief Summary of the Proceedings

BY

Mr. K. Bheema Rao, B.A., F.C.S.,

Senior Assistant Chemist and Secretary, Mysore Board of Agriculture.

The Thirteenth Biennial Meeting of the Board of Agriculture in India was held at the Daly Memorial Hall, Bangalore, from January 21st to 25th, 1924, under the presidency of Mr. S. Milligan, Agricultural Adviser to the Government of India. There was a large attendance of members and visitors present.

The meeting was opened by His Highness the Maharaja of Mysore, who, in welcoming the members and visitors for the first sessions of the Board to be held in an Indian State, referred to the importance of Agriculture to the prosperity of the country, laying special emphasis on agricultural co-operation and cattle improvement. Referring to the question of experimental farms, His Highness observed that experimental farms should be looked upon primarily as out-door laboratories for seeking definite information as to the best methods of crop and live-stock production, and it was therefore an extremely unwise and short-sighted policy to lay emphasis upon their money-making side, although the greatest care should be exercised to see that funds are expended as economically as possible consistent with sound work, and that an Agricultural Department should be judged not by the money returns obtained from the farms under its control, but by the influence it exerted upon the agriculture of the State. His Highness then expressed his appreciation of the work the Mysore Agricultural Department was doing under the control and guidance of Dr. Coleman, and concluded his address by referring to the unmistakable evidences one could see in all parts of India, of the beneficial results of the labours of the Board during the past nineteen years, and exhorted the members to put forth still greater efforts to cover the immense distance which still lay between Indian Agriculture as it is and Indian Agriculture as it should be.

Before commencing the Proceedings, Mr. Milligan conveyed the appreciation of the Board of His Highness' kindness in inviting them to hold their biennial meeting in the State and in presiding at the opening meeting. He felt that the words of encouragement

His Highness had been kind enough to say would prove an incentive to further work not only in Mysore but throughout India.

Addressing the members, Mr. Milligan referred to the very anxious time the Agricultural Department had had since they last met owing to the financial stringency which appeared to have a tendency to become chronic. Although the current activities of the Department had not been affected by the financial stringency to any considerable extent, it had stood in the way of further development of Departmental work. He referred to the losses the Board had suffered by the deaths of Messrs. Petty and Henry, and Thakur Mahadeo Singh, all in the prime of life and of much promise. A resolution of sympathy with their sorrowing relatives was proposed and carried in silence, all the members standing.

Continuing, Mr. Milligan said that the scheme for the expansion of the Pusa Institute and the provision of post-graduate training to qualify Indians for admission to the Indian Agricultural Service which had received the approval of the Secretary of State had not been proceeded with. A beginning had, however, been made in providing post-graduate training in sciences allied to Agriculture, including Animal Husbandry and Dairying, and a similar training for veterinary officers had been arranged for, as an experimental measure, at Muktesar. The dairy and cattle breeding farms of Bangalore, Wellington and Karnal had been transferred from the Military to the Agricultural Department with a view to provide the latter with experimental and educational facilities. A Dairy Manager's course had been started in Bangalore, which would qualify students for the "Indian Diploma in Dairying".

Turning then to the programme of work, he said that, as usual, some of the subjects to which he just drew the attention of members, were to be considered in committees before they were laid before the general meeting, and after appointing committees to deal with these subjects, the Board proceeded to the discussion on *Subject 1.—To consider the progress made in giving effect to the recommendation of the Indian Cotton Committee for* 1917-18 *with special reference to* (a) *the work of the Central Cotton Committee ;* (b) *the recommendations of the Board of Agriculture of* 1919 *in regard to cotton marketing.*

In introducing the subject the President said that the original Committee presided over by Mr. MacKenna had been expanded and

turned into a permanent committee called the Central Cotton Committee for all India, and that this Committee had its headquarters in Bombay, and it had carried through a great deal of the original Committee's recommendations. He then called on Mr. Burt, Secretary of the Central Cotton Committee, to give a short sketch of the work of the Committee.

Mr. Burt said that in the Indian Central Cotton Committee, they had now a unique organization on which all sections of the cotton industry were represented. They had funds raised for the improvement of the industry by the cotton cess, and they had been able to start a well balanced research programme. They had been able to put into effect many recommendations of the original Cotton Committee as well as those of the Agricultural Board. Their policy in regard to agricultural research was to make funds available for special investigations, and wherever they could, to supplement the work of the various Agricultural Departments. A technologist had been appointed and arrangements were being made to start research work which, he expected, would be of considerable value to agricultural investigators in their work on the improvement of cottons.

Steps were being taken to prevent the introduction of the boll weevil from America into India. The Government of India had provisionally accepted the Committee's proposal that the Pest Act should be put into force, that all American cotton imported should be fumigated on arrival in India with hydrocyanic gas, and that Bombay should be the only port in India where American cotton should be landed.

The Cotton Transport Act had been passed and was in force in practically the whole of the staple cotton-growing parts of the Bombay Presidency, and would, he hoped, be brought into force in Madras and Central Provinces at no very distant date. The recommendations of the Committee for the regulation of gins and presses were still before the Government of India, and there was every reason to expect legislation at an early date, and when that was done, he felt, that two of the outstanding abuses which not only caused considerable inconvenience and annoyance to the cotton trade, but also very serious economic loss to the cotton grower, would be considerably reduced.

In reply to Mr. Noyce who wished to know to what extent Indian staple cotton was improving with relation to Lancashire requirements Mr. Burt said that the exportable surplus of staple cotton from India should be roughly estimated at about 300,000 bales, the Indian Central Cotton Committee had been in touch with the Empire Cotton Growing Corporation and the British Cotton Growing Association to see what steps could be taken to establish a permanent demand for Indian staple cottons in Liverpool. The Committee were also arranging to send to the British Cotton Growing Association sample bales of the improved strains of cotton which the Agricultural Department had developed on a commercial scale. These bales would undergo spinning tests and would be shown round to spinners and brokers.

In reply to Mr. Henderson's enquiry about the extension of cotton area which was expected to follow the completion of the Sukkur barrage, Dr. Mann said he was placing a scheme shortly before the Indian Cotton Committee for research in cotton-growing under the conditions of perennial irrigation provided by the Sukkur barrage canal, and if that was adopted he would make every effort to obtain types suitable for the Sind tract. He added that he was already arranging for an experimental station independent of the barrage itself, and if he could get the endorsement of the Indian Cotton Committee, the Commissioner of Sind, and the Local Committee he felt he would be able, when the Sukkur barrage water was available, to give to the people useful information with regard to cotton and other crops.

Regarding cotton marketing Mr. Burt said that the Indian Central Cotton Committee had practically adopted the recommendations of the Agricultural Board. At the request of the Government of Bombay they had submitted draft rules for the working of markets on lines similar to those in Berar but with a definite provision that half the members of the Committee should be representatives of the Cotton Growers of the area served by the market. Mr. Burt added that the Committee would welcome the opinion of the Board on the question of the publication of cotton prices. The point for discussion was whether prices of ginned cotton should be posted or whether *kapas* prices should be notified. Although the latter practice was obviously the more advantageous it necessitated

the using of a 'safe' factor to convert cotton prices into *kapas* prices, and it was feared that when competition was keen the actual prices might exceed calculated prices. He thought that a possible way out of this difficulty would be to convert not the prices but the differences into terms of *kapas*, *e.g.*, Rs. 5 per candy in Bombay might correspond to a rise of 3 as. per maund *kapas* in the particular local market. There was much interesting discussion on this subject, and although most of the members were in favour of publishing prices there was much difference of opinion about the details.

The Board then proceeded to discuss—

Subject II.—The Utilization of Phosphates.

In introducing the subject, the President observed that the question had been discussed by the Board of Agriculture in India in 1917 and referred to a special committee for report. After considering that report the Board recommended that with a view to encourage the extended use of phosphatic manures a survey of the resources of the country in mineral phosphates should be undertaken by Government, and that control over all the internal mineral sources of supply should be retained by Government.

The supplies of phosphatic manures in India consisted of raw mineral rock, bones and fish manure. Nothing had so far been done to develop the supplies of rock phosphates and no information was available about the quality and quantity of these minerals. The supply of fish guano was variable. Bones were therefore probably the most important phosphatic manure in India at present. The question of restriction on the export of bones was considered by the last Board. A majority of the members were of opinion that although it was doubtful whether the method of prohibition or restriction of export of bones, fish manure and other phosphatic manures would achieve the end desired, the Government of India should be requested to appoint a small committee to consider the question and suggest a constructive policy which would lead to the retention of its manurial resources, specially, of phosphates. This committee had not yet been appointed.

At the request of the President, Mr. Hutchinson gave some idea of how it was possible to make phosphates available by natural bacterial process. He was of opinion that practically all soils in

India contained a certain class of bacteria which are capable of oxidizing mineral sulphur to produce sulphuric acid which will dissolve mineral and organic substances. This would give us an easy method of rendering our supply of indigenous phosphates available and do away to a great extent with the import of phosphates. He was not sure how far the process was applicable to bones, but it was very likely that it would be just as applicable to bones as to mineral phosphates. He was of opinion that this problem merited the same recognition as that given many years ago to a similar one about the fixation of nitrogen, and he would therefore propose a resolution to that effect.

Many of the members spoke on the benefits of using phosphatic manures for all crops in general and paddy in particular. Mr. Yegnanarayana Iyer said that in Mysore phosphatic manures had given exceptional results with paddy and pointed out that drastic measures had been taken in England even before the war to stop the export of phosphates, and he thought India should be prepared to follow that example. The following resolutions were then passed :—

Resolution I.—*That Government be asked to give immediate effect to the recommendation of the* 1922 *Board with reference to the appointment of a committee to investigate the economic position of indigenous fertilizers in India, and to formulate a definite constructive policy to ensure their use for the benefit of the Indian ryot.*

Resolution II.—*That in the opinion of this Board, the utilization of indigenous phosphates in India would be facilitated by local investigation of the method of bacteriological solubilization by sulphur-oxidising bacteria, and this method, therefore, receive the particular attention of the expert staff of the various Agricultural Departments which should, if necessary, be strengthened for that purpose.*

The second and third days were devoted to the consideration, by the several committees, of the subjects with which they had been appointed to deal and to the drafting of their reports.

On the reassembling of the Board on the fourth day, the following resolution was moved and passed unanimously :—

Resolution III.—*That the Board desires to express its satisfaction that so many of the recommendations of the Indian Cotton Committee,* 1917-18, *and of the Board of Agriculture,* 1919, *have been*

given effect to. In particular it desires to place on record its appreciation of the support which the Central Cotton Committee has received from all sections of the cotton trade. The Committee has already achieved important results and this is due in a large measure to the serious way in which commercial men of standing have given their time and thought to the work of the Committee.

The Board then proceeded to discuss—

Subject III.—To review the progress made in non-credit agricultural co-operation in India and a consideration of ways and means of stimulating further progress.

The subject had been referred to a Committee under the Chairmanship of Dr. Mann who, in presenting his report, observed that the subject was an exceedingly wide one and the Committee had therefore been able to deal with only one or two sides of it. In the first part of the report, they had dealt with the relationship between ordinary agricultural propaganda and the utilization of co-operation for bringing that knowledge into general use. The Committee was strongly of opinion that the best method of overcoming the hiatus that existed in India between demonstration and actual practice was the utilizing and organizing of bodies of cultivators into co-operative societies. The Committee felt that the Agricultural Department should recognize that it was in co-operation with the Department of Co-operation and with co-operators generally that the extension and general adoption of agricultural improvements had its greatest chance. It was further suggested that the staff which was to develop this should be combined agricultural and co-operative, although there might be difference of opinion in different parts of India as to whether the propaganda should be directed and controlled by the Agricultural or by the Co-operative Department.

The second part of the report dealt with societies of co-operative sale. The Committee was of opinion that, to ensure success in matters of co-operative sale, one must deal with large units and that amateur management was no good in these transactions which competed as a rule with very highly developed trading organizations. It was therefore necessary to develop this business under expert professional management. Co-operative purchase was also very largely conditioned by similar considerations.

Dr. Mann then drew the attention of the Board to the question of consolidation of holdings by co-operative methods to a certain extent under the influence of Mr. Calvert in the Punjab.

An interesting discussion ensued, the principal point at issue being the question whether the non-credit form of co-operation which everybody agreed was so beneficial to the ryot, should be done by the Co-operative Department or by the Agricultural Department. Emphatic views were expressed on either side. Mr. Yegnanarayana Iyer was of opinion that the divergence of opinion was based on a misconception of what was meant by a non-credit co-operative society. He said that there were two types of these ; one of a purely business character that was formed with a view to divert the profit from the middle man to the pocket of the producer. No technical agricultural officer was required for starting a society of that sort. Another type was the society for the sale of improved ploughs, seeds and manures, etc., and this could only be carried out after a great deal of work had been done in popularising these improvements, and in this the help of the agricultural officers was indispensable, and these societies must be in the hands of the Agricultural Department. He added that it would be a disaster to place this type of society under the Co-operative Department which he felt would only curtail progress.

Dr. Coleman felt that no sharp distinction existed between the work of the two departments. The work of an agricultural officer was useless if he did not attempt to get the co-operation of the ryot in his work. The necessity for co-operation was a general factor with regard to all agricultural work.

The President considered that the divergence of views fully justified its inclusion in the report. He thought that the Board would also be unable to agree on this point. The report of the Committee was adopted unanimously, as also a resolution to the effect that—

Resolution IV.—*The Board recognizes the fundamental importance to agriculture of the work on Consolidation of Holdings that is being carried out under the influence of the Co-operative Department in the Punjab, and wishes to bring the fact prominently to the notice of Local Governments.*

The Board then proceeded to discuss—

Subject IV.—Is it possible and desirable to make Government farms, including experimental, cattle-breeding, seed and demonstration farms, pay?

Dr. Clouston, Chairman of the Committee appointed to consider this subject, said, in opening the subject, that it was a very important subject, as, in Provincial Councils many criticisms had been passed to the effect that Government farms should be run at a profit.

Mr. Henderson agreed that the subject was an important one not only on account of the existing farms but also from the fact that all new schemes would be considered from a financial aspect and it was doubtful whether they would be passed if they could show no profit. This might prove a great hindrance to the many special investigations which had to be carried out from time to time. After some further discussion about the starting of farms purely from an economic point of view and the conducting of demonstrations on the ryots' own lands, the following resolution was unanimously passed :—

Resolution V.—*This Board is of the opinion that the essential factor in the working of a Government Agricultural Station is the fulfilment of the specific object or objects for which the station is established. While realizing that the station should be managed as economically as possible, the Board is of opinion that the financial aspect is of entirely secondary importance, and should not be allowed to interfere with the object or objects of the stations.*

The report of the Committee was then adopted and the Board next proceeded to discuss—

Subject V.—To consider the steps taken to give effect to the recommendations of the Board of Agriculture of 1919 *for the improvement of (a) Forecasts; and (b) Final statistics of the Area and Yield of crops in India.*

In presenting the report Mr. Burt, the chairman of the Committee, said that with regard to the recommendations of the Board of Agriculture, 1919, he regretted to have to report that owing to retrenchment, statistical staffs had been cut down, statistical compilations had been reduced and consequently many of the valuable checks which were referred to in the report of the Committee of that

Board were no longer existent. He then moved the two following propositions which were carried unanimously :—

Resolution VI.—*The Board regrets that not only have many of the recommendations of the Board of Agriculture of* 1919 *not been given effect to, but that on the contrary reduction of statistical staffs and of compilation has made the preparation of reliable crop forecast more difficult than before. They desire to emphasize the importance to the country of accurate agricultural statistics and of proper forecasts for the major crops.*

Resolution VII.—*The Board observes with regret that only in one province does the recommendation of the Board of Agriculture of* 1919, *that each Director of Agriculture should be provided with a qualified Statistical Assistant. appear to have been adopted. They are strongly of opinion that the appointment of such Statistical Assistants is an absolute necessity if any real improvement is to be made in forecasts.*

After a few observations on the part of some members about the inaccuracy of present methods. the following resolutions were also carried unanimously :—

Resolution VIII.—*While every effort should be made to take the fullest possible advantage of trade statistics. it is not possible to obtain from such statistics the figures for the total production from which to calculate the standard out-turn per acre. Crop-cutting experiments must remain the basis of such standards.*

Resolution IX.—*The standard out-turns for various crops now in use have resulted from crop-cutting experiments made over a number of years. verified by such information as has been available from trade statistics. Changes should only be made as a result of crop-cutting experiments sufficiently numerous to possess a definite statistical value. In choosing fields for crop-cutting experiments no attempt should be made to select average fields. but the selection should be made purely mechanically so as to give a statistically random distribution. changes in the standard yield should not be made as a result of discrepancies brought to light by trade statistics. as such discrepancies occur in the product "Condition Factor × Standard Yield" and the fault is most likely to be in the interpretation of the primary condition reports.*

Resolution X.—*In the opinion of the Board of Agriculture the first step in any attempt to improve statistics should be to appoint a Statistical Assistant under each Director of Agriculture with an adequate staff for the carrying out of crop-cutting experiments on a limited scale with the object of determining how such experiments can best be conducted for the province generally. The organization subsequently required, could then be determined.*

Resolution XI.—*The Board of Agriculture strongly recommends that the compilation of rail-borne trade statistics should be revived, as these statistics provide for many crops a most important check on the estimates of production in addition to information essential to the study of the economic progress of India.*

Resolution XII.—*That this Board endorses the recommendation of the Indian Cotton Committee, the Board of Agriculture,* 1919, *and of the Indian Central Cotton Committee, that weekly returns from all cotton pressing factories of cotton pressed should be made compulsory as early as possible.*

Resolution XIII.—*That in all cotton-growing provinces a definite effort should be made to obtain a reasonable estimate of the amount of cotton consumed in villages, whether for hand-spinning or for domestic purpose. This could probably be done by a detailed statistical study of the information available for individual internal trade blocks. Road-borne trade would also be of importance and the extent of this would necessitate special local enquiry.*

The Board then proceeded to discuss—

Subject VI.—To consider the steps taken to give effect to the recommendations of the Indian Sugar Committee with special reference to those relating to the Coimbatore cane-breeding station.

The Committee which dealt with this subject was presided over by Mr. F. Noyce, who said, in presenting his report, that there were one or two points which called for comment. He considered that the importance of the sugarcane station would be better realized if it were made an Imperial one. As it was situated in Madras, it was very difficult at present to get any funds from the Government of India to increase its size. The Committee did not endorse the view of the Sugar Committee that the work on the evolution of improved varieties of cane for Upper India which will withstand the indifferent usage of the ordinary cane-grower should be aban-

doned as impracticable. On the contrary it held that it should be encouraged, though it agreed with the Indian Sugar Committee that the most profitable line of progress lies in the simultaneous adoption of improved varieties of cane and improved agricultural methods.

With reference to sugarcane selection work he thought it would be impossible for some years to come to establish an All-India Sugar Research Station and in the meantime Coimbatore should be made a sugarcane breeding centre for the whole of India, and other research work connected with sugarcane should be left with the provincial departments concerned. He moved the following resolution which was carried unanimously :—

Resolution XIV.—*This Board supports the recommendations of the Indian Sugar Committee that the Coimbatore cane-breeding station and the post of Sugarcane Expert should be made permanent and that the station should be transferred to Imperial control. It further recommends that immediate effect be given to these recommendations. It strongly supports the recommendation of the Sugar Committee that the scope of the station should be enlarged in order to include the breeding of new varieties of thick canes for Peninsular India, Burma and Assam, and considers that the area and staff of the station should be increased immediately for this purpose. In the meantime, every effort should be made to commence work on breeding thick canes with the facilities at present available. It would add that even for work on thin canes an extension of the present area is highly desirable.*

Several other members spoke about the excellence of Coimbatore canes and the advantage of transferring the work to Imperial control, and the report of the Committee was adopted.

Mr. Fletcher called attention to the recommendation of the Sugar Committee for the appointment of a special Entomologist for sugarcane pests and said, that about 10 or 12 years ago they had imagined that sugarcane borers were of one species and that they could be trapped by growing maize, but as a result of the work done so far, he had found that there were quite a number of species, but had found it impossible to go further in the investigation which he considered would require the services of a whole-time officer. He therefore moved the following proposition which was adopted unanimously :—

Resolution XV.—*The Board endorses the recommendation in paragraph 247 of the Report of the Indian Sugar Committee, that the staff of the Imperial Entomologist should be strengthened by the appointment of an additional Entomologist whose principal duty would be the investigation of cane pests. In view of the large recurring losses at present caused by borers and other cane pests, the Board considers it desirable that steps be taken, as early as practicable, to put this recommendation into effect.*

On the fifth day the Board took up for discussion the report of the Cattle Conference. In opening the discussion Mr. Milligan, the Chairman of the Conference, said that the Conference had generally approved of the present curriculum of the Imperial Institute of Animal Husbandry and Dairying at Bangalore and the work of the Pusa, Bangalore and Wellington and Karnal Dairy and Cattle-breeding Farms. As regards cattle improvement the Conference thought that considerable improvements were taking place in various British Indian Provinces and Indian States, although what was being done was far too little except in the Punjab which had been doing a good deal. The problem was an immense one and more ought to be done in the matter not only of finance but of influencing those who are in a position to afford finance.

Dr. Coleman, Mr. Milligan and Rao Sahib Ramaswami Sivan spoke about the immense and fundamental importance of the work on animal nutrition which was being done by Mr. Warth at Bangalore. Several other members also endorsed the opinion expressed by Dr. Coleman and then the following resolution was passed unanimously :—

Resolution XVI.—*This Board wishes to emphasize the fundamental importance of the work on animal nutrition which is being done by the Imperial Physiological Chemist. It desires to impress upon Local Governments and Departments of Agriculture the absolute necessity of co-operation with the Imperial Physiological Chemist in his work.*

The President then explained for the information of those who had not followed events since the last meeting of the Board that the Military Dairy Farms at Wellington, Karnal and Bangalore had been handed over to the Agricultural Department for the purpose of dairy instruction and cattle-breeding. They had been able to

draw up a fairly complete programme for Pusa, Bangalore and Wellington on the lines at present existing on these Farms. He then referred to the various suggestions that had been made about the further extension of the work of cross-breeding.

There was then some discussion as to whether such of the subjects as had not been referred by the Board, but had yet been included in the report of the Cattle Conference should find a place in the proceedings of the Board. Before passing any resolution about it, Messrs. Sayer, Dobbs and Smith spoke about the work on cattle-breeding done by the Military Department under Colonel Matson and the danger of the results of their labours going to waste if, on account of a change of policy, the Military authorities were forced to dispense with their dairies, and proposed the following proposition which was passed unanimously :—

Resolution XVII.—*This Board expresses its appreciation of the value of the work done by the Military Dairy Department in preserving and grading up the Saniwal breed of milch-cattle, and desires to thank that department for its assistance and co-operation, more especially in handing over, for the use of the cattle-breeding operations, the farms at Bangalore Karnal and Wellington, and trusts that if at any future date the dispersal of any pedigree herds is contemplated, the Agricultural Department may be given the first offer of taking over the herds as a whole.*

In the unavoidable absence of Mr. Quinlan, Mr. Dobbs desired to move a proposition about the breeding of cattle in Bihar and Orissa. He said that the policy adopted in Bihar, so far as it went, was cut down by the Legislative Council and the Advisory Committee for Agriculture. They considered that herds of cattle should only be established where they could be made to pay by the sale of milk. He could only have the Montgomery or Saniwal breed because by having other breeds he could not make the farms pay. Mr. Quinlan was anxious to start a farm at Shahabad, chiefly with a view to improving the local breed and for export of cattle to Bengal. He wanted to develop bulls for improving the local breed for Northern Bihar near the Nepal country with a view to improving the export. He wished therefore to move the following proposition :—

Resolution XVIII.—*The Board wishes to bring to the notice of the Government of Bihar and Orissa the value of the results achieved*

in other provinces—particularly in the Punjab and Bombay—by the definition and improvement of popular types of cattle through the establishment of breeding herds. The position of Bihar as the chief breeding ground for cattle imported by Bengal seems to guarantee that similar work in that Province, besides raising the value of the local cattle for the cultivators' own use, would greatly increase the value of an already important and profitable trade.

The resolution was duly seconded and carried unanimously.

Discussion on the report of the Cattle Conference was resumed and mostly centered round Sardar Darshan Singh's proposal for approaching Government for certain revenue concessions for fodder cultivation, and the importance of propaganda work in connection with cattle improvement. The following resolutions were then adopted unanimously :—

Resolution XIX.—*That this Board adopts the report on Subjects VII, VIII & IX of the Cattle Conference.*

Resolution XX.—*The Board supports the following recommendations of the Cattle Conference :—*

(1) *That in future a Conference on similar lines and of similar composition and size to this, be held yearly at centres to be agreed upon, the place of meeting to be selected by each Conference for its succeeding meeting. The Conference further recommends that the necessity for providing facilities to enable all officers interested, to attend this Conference be impressed upon all Local Governments and Indian States.*

(2) *That a Central Bureau of Animal Husbandry be established at Pusa under the control of the Agricultural Adviser to the Government of India and with the Imperial Agriculturist as Secretary, and that the Secretary be given sufficient technical and clerical assistance to adequately deal with the work of this Bureau as it develops. The main functions of this Bureau, to commence with, would be :—*

(a) *The collection and dissemination of information concerning cattle-breeding and allied subjects.*

(b) *To assist in the disposal of surplus pedigreed stock specially from Government herds.*

(c) *The standardizing of methods of milk recording and breed records to be adopted by Local Governments and Indian States.*

(d) *The maintaining of general herd books of breeds, or of milch cattle as distinct from specific breeds, found in more than one Province or State.*

(e) *The encouragement of the sale and use of pedigreed stock.*

(f) *The keeping of the cattle-breeding departments of Local Governments and Indian States, and those specially interested in scientific cattle-breeding, in touch with each other.*

The Board next proceeded to discuss—

Subject X.—To review the progress made in popularizing the use of improved agricultural implements and power machinery in India with reference to (a) *The provision of facilities for sale, hire and repair ;* (b) *Propaganda ; and* (c) *The designing and testing of implements.*

Dr. Coleman, Chairman of the Committee appointed to discuss and report on this subject, expressed regret that his Committee were not able to submit a report as the information at their disposal was very scanty. They had received reviews only from a few of the Provinces and Indian States. He said that he would, however, suggest that either the reviews received could be published in the proceedings of the Board or else an effort should be made to obtain similar reviews from other Provinces and States and have a short resumé published in the "Agricultural Journal".

The President considered that the subject was of immense importance, for not only had the efficiency of an implement an effect on crop out-turns but also on the cattle themselves, and supported Dr. Coleman's suggestion of publishing a resumé if they could obtain reviews from the remaining provinces. He added that, if the material in these reviews was sufficient for the purpose, he would have a Bulletin written on the subject.

Dr. Coleman proposed a resolution to the effect :—

Resolution XXI.—*That every effort should be made to collect all reviews on the progress made along the lines of the terms of reference from all the provinces and Native States, and that a Bulletin embodying the information contained in these reviews be published by the Agricultural Adviser to the Government of India.*

The resolution was seconded and carried unanimously.

The last subject was then taken up, *viz.*—

Subject XI.—The desirability of bringing waste lands under cultivation with a view to increasing the production of food grains.

In opening the discussion the President remarked that the subject had been introduced into the agenda by the Government of India, who had expressed great anxiety regarding food crops and had desired that the subject of the production of food grains should be discussed at the Board. The subject, however, was subsequently narrowed down to the present terms of reference. The Board had, therefore, to confine its attention to the question of the utilization of waste lands. He did not think that there was any necessity to pass any resolutions, but the Board could treat the subject as one calling for an exchange of views.

A very interesting discussion followed which brought out the different causes that were responsible for the existence of these waste lands in different provinces and the different remedies suggested. Waste lands were of two kinds—unoccupied lands and occupied lands left uncultivated. Insufficient supply of labour and capital, bad climate, insufficient or excess of water and lack of means of transport were considered to be the chief causes for these and providing facilities for the granting of loans by Government or by Co-operative Societies, introduction of improved agricultural implements including tractors, and supply of improved seeds, consolidation of holdings, and opening up of communications were among the chief remedies suggested.

Dr. Coleman emphasized the importance of cultivating the waste lands for the production of fodder crops as well.

Rao Sahib Ramaswami Sivan and Mr. Yegnanarayana Iyer were in favour of assigning waste lands with sufficient State-aid to ex-officers of the Agricultural Department and students of Agricultural Schools and Colleges for being developed into profitable farms.

The President agreed with the members who had emphasized the necessity of ploughing the land before the monsoon set in, but did not think that the tractors would take them very far as they were too expensive. He referred to the general difficulty of getting suitable ploughs, and incidentally paid a tribute of praise to the Mysore plough, which he thought had been constructed on very sound lines. He said he would be interested to watch its development. The discussion was then closed.

Before concluding, the following resolution was passed unanimously :—

Resolution XXII.—*The Board desires to express its grateful thanks to His Highness the Maharaja of Mysore for the interest he has taken in its proceedings and for the hospitality he has been good enough to extend to it in Bangalore and Mysore. It also desires to express to Dr. Coleman and the officers of the Mysore State its high appreciation of the excellence of the arrangements made for the meeting of the Board.*

Dr. Coleman expressed the great pleasure which His Highness and the Government of Mysore felt to have the Board as their visitors especially as it was the first time an Indian State had entertained them. He added that His Highness had always taken a great interest in agriculture which was the basic industry of the country.

In concluding the proceedings, the President made a brief review of the progress of the Board since its conception. He pointed out that in the early stages a large number of experienced officers of other departments had attended, and he considered that the presence of those officers had helped to build up the Board until of recent years, it had become independent. The Board was now a mixed one, mainly consisting of agricultural officers, but also supported by able men of other departments. In this connection the officers of the Veterinary Department had proved particularly useful. He referred to the high reputation the Board has been maintaining and added that this was the last Board which he would attend and thanked all the members for the tolerance and ungrudging help he had always received. The meeting was closed after a vote of thanks to the President was proposed and carried unanimously.

Scheme for the Formation of a Colony of Agriculturists trained in Improved Agriculture.

Object.—The object of the Scheme is to induce a number of men trained in the colleges of Agriculture to take up and develop land, in colonies.

Location.—Areas under the Marikanave, Borankanave, Krishnarajasagara channels and other suitable places where large areas of land may be available in compact blocks. The minimum area thus available should be 250 acres of wet land and 360 acres of dry land.

Size of Colony.—Each colony should provide for twelve holders, each of whom should be given 20 acres of wet and 30 acres of dry land.

Conditions of the Grant.—(*a*) The land should be given free of cost.

(*b*) No assessment should be charged for the first five years after which the usual rates may be levied.

(*c*) The holder should live on the land and cultivate it.

(*d*) The land should all be brought under cultivation within three years after it is taken up.

(*e*) The land should be farmed on improved lines, these being laid down by the Director of Agriculture.

(*f*) The land should not become the absolute property of the holder until after all loans to the Government shall have been discharged and until a period of twenty-five years has expired from the date of the grant of the land, when alone the holder will be free to alienate the land by sale or mortgage. The holder may, however, sell the land to a colonist who is entitled to the privileges of this Scheme, within the period of 25 years, if he so desires. The purchaser will abide by all the conditions of this Scheme until a period of twenty-five years shall have elapsed from the date of the first grant. The price to be paid for the land in such cases shall be determined by the Director of Agriculture.

(*g*) The rights vesting under this Scheme shall not be partible under the Hindu Laws of Inheritance but shall devolve intact to the entire family.

(*h*) The colonist should furnish Government a security worth Rs. 1,500.

Loans, Interest and Repayment.—A loan up to a maximum of Rs. 6,000 may be given to each holder. The rate of interest should be 5%. The amount should be advanced only in instalments not exceeding Rs. 1,000, the exact sum depending upon the value of the work executed, as may be certified by the Director of Agriculture.

No loan under these rules shall be given after the expiry of the three years which is the period fixed for bringing the land under cultivation unless it be for the purpose of paying off debts incurred in permanent improvements. The full loan should be repaid within twenty years from the date on which the last instalment may have been advanced.

Roads.—The whole area of the colony should be surveyed, blocks of 20 acres of wet and 30 acres of dry land marked out, and a road connecting the colony with a convenient point on high road, made at the cost of Government.

Houses.—The colonist shall build his house in his own holding. The location, the size, and pattern of the house and its appurtenances, such as cattle stall, manure pits, farm yard, etc., shall be generally as may be prescribed by the Director of Agriculture.

Penalty for Default.—The land including buildings shall be liable to be resumed by Government if any of the conditions of the Scheme are infringed in spirit or letter.

Qualifications of Colonists.—No one shall be entitled to the benefit of this Scheme, except (1) members of the staff of any of the Departments of Agriculture; (2) those who have undergone a full course of training in any recognized agricultural institution.

THE MYSORE AGRICULTURAL AND EXPERIMENTAL UNION

Programme of Experimental Work for 1924.

CIRCULAR.

The Department of Agriculture desires to arrange with members of the Union for the carrying out of the following experiments during the coming season :—

1.—Experiments with Implements.

Trial of the Mysore plough in comparison with any other type of improved plough, preferably the Kolar Mission plough.

2.—Experiments with Seeds.

Trial of selected strains of—

(*a*) Ragi—seed enough for 3 guntas each of two new varieties will be supplied.

(*b*) Ground-nut—seed enough for 3 guntas each of two new varieties will be supplied.

(*c*) Castor—seed enough for 3 guntas each of any two new varieties will be supplied.

(*d*) Cotton :

(1) Doddahatti—seed enough for 3 guntas will be supplied.

(2) Sannahatti—seed enough for 12 guntas each of two varieties will be supplied.

(Only members in cotton tracts need apply.)

(*e*) Paddy—seed enough for 3 guntas each of any two varieties will be supplied.

(*f*) Sugarcane—seed enough for one gunta each of two Hebbal seedling canes will be supplied.

Conditions of Supply of Seed.

1. The seed of each variety shall be sown in separate plots with check plots arranged as per instructions issued by the Department of Agriculture.
2. The results of the experiments shall be reported after harvest in the form which will be supplied.

3.—Experiments with Manures.

(1) Ammonium Sulphate on Sugarcane. Between 12 and 20 guntas of land will be required. Ammonium Sulphate intended for experiment will be supplied at cost price ; the value of manure per experiment may not exceed Rs. 25.

(2) Manuring of paddy with Oilcake and Super-phosphate or Bone-meal and Sulphate of Ammonia—not less than 10 guntas of land will

be required. The manure intended for experiment will be supplied at cost price ; the value of manure per experiment may not exceed Rs. 5.

4.—Experiments on the Control of Insect Pests.

(*a*) Sugarcane Borer as per instructions to be issued by the Department of Agriculture.

(*b*) Pests of Stored Pulses.

5.—Experiments on the Control of Fungus Diseases.

Black Rot of Coffee.—Spraying material and sprayers will be supplied by the Department. The labour to be supplied by the member.

6.—Experiments on Fodder Conservation.

Use of Sunflower for Ensilage—seed for one acre will be supplied.

7.—Sericultural Experiments.

Rearing.—Experimental Rearing with seed of new races of Silkworms. 100 layings of eggs of selected new races will be issued free for each of 3 experimental rearings on condition that the rearing shall be conducted according to written instructions which will be issued by the Department, and that a report shall be furnished in the form which will be supplied. The cocoons must be sold to the Department who will give 10 per cent above market rates.

Reeling.—Foot reeling machines will be lent for 3 months free of charge on condition that they shall be used for reeling at least 10 lbs. of silk and that a report shall be furnished of results in the form prescribed by the Department. The experimenter may, with the consent of the Superintendent of Sericulture, sub-lend the machine, subject to the same condition. A demonstrator will be sent to instruct the experimenter in the use of the reeling machine.

8.—Maintenance of Farm Accounts.

Maintaining accounts on the model of the forms drawn up by the Union at the IV Annual Meeting. A copy of the model forms will be supplied on requisition.

Application from members intending to undertake the experiments should be made to the Secretary, The Mysore Agricultural and Experimental Union, Seshadri Road, Bangalore, on the following form,* the particular experiment or experiments they desire to undertake being specified by being ticked off on this circular. The seed, manure, etc. will be supplied in the order in which the application is received as long as the stock lasts.

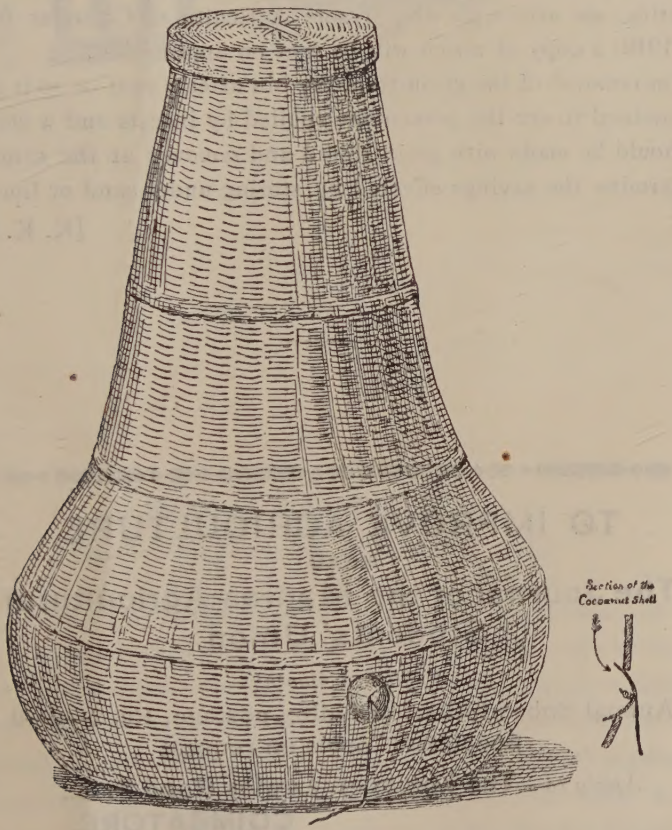
BANGALORE,
30*th January* 1924.

LESLIE C. COLEMAN,
President,
The Mysore Agricultural and Experimental Union.

* *The form is omitted here.*

Instructions for Carrying out Tests of a Remedy against Stored Grain Pests.

The remedy consists in spreading a layer of sand on the upper surface of the pulses stored. The pulses are kept in bamboo bins with a narrow neck and broad bottom. There is a hole near the bottom closed by a cocoanut shell. Through this hole quantities required for household use may be withdrawn as need arises. The bins may be of any capacity.



Before storing, dry the seeds thoroughly in the sun for three days and put in the bin taking care that they settle properly. This is very important as settling after the layer of sand has been put in may expose the seed or leave space between at the edge of the layer through which insects may escape or get in. For at least a month immediately after storing no seed should be withdrawn and an occasional inspection is necessary to see that the layer is intact.

If it is, the beetles that emerge from the infested seeds will find their way to the top and get through the sand and once they get out

of it they will not be able to get back to spoil more seeds. They meet and pair but for egg-laying they want the seed which however is below the sand and is beyond their comprehension to reach. The layer of sand should be not less than two inches thick.

In the case of paddy instead of sand powdered lime should be used. These also should be spread over carefully on the top surface of the paddy.

For detailed description of the pest of stored pulses and method of storing, see article in the Mysore Agricultural Calendar for the year 1919, a copy of which will be sent on application.

On removal of the grain from the bin after a year or so it should be examined to see the percentage spoiled by insects and a comparison should be made with grain stored and removed at the same time to determine the savings effected by storing under sand or lime.

[K. K. K.]

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